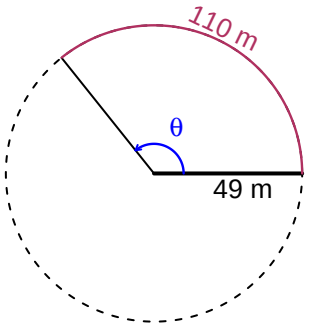
Name: Date:

Trig Final (SLTN v619)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 49 meters. The arc length is 110 meters. What is the angle measure in radians?

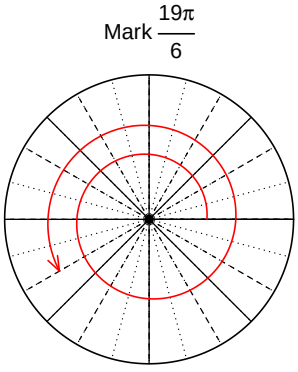


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

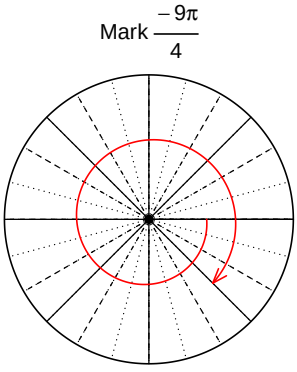
$\theta = 2.245$ radians.

Question 2

Consider angles $\frac{19\pi}{6}$ and $\frac{-9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{19\pi}{6}\right)$ and $\sin\left(\frac{-9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(19\pi/6)$



Find $\sin(-9\pi/4)$

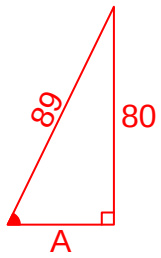
$\cos(19\pi/6) = \frac{-\sqrt{3}}{2}$

$\sin(-9\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{-80}{89}$, and θ is in quadrant IV, determine an exact value for $\cos(\theta)$.

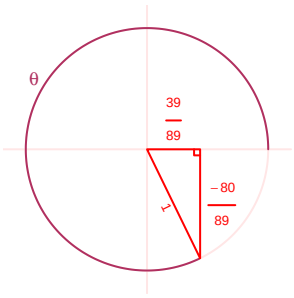
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 80^2 = 89^2$$
$$A = \sqrt{89^2 - 80^2}$$
$$A = 39$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\cos(\theta) = \frac{39}{89}$$

Question 4

A mass-spring system oscillates vertically with an amplitude of 4.23 meters, a midline at $y = 7.26$ meters, and a frequency of 8.75 Hz. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 4.23\sin(2\pi 8.75t) + 7.26$$

or

$$y = 4.23\sin(17.5\pi t) + 7.26$$

or

$$y = 4.23\sin(54.98t) + 7.26$$